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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/521,424

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Atakan Peker

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EXAMINER

SHEVIN, MARK L

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/521,424	Applicant(s) PEKER, ATAKAN	
	Examiner Mark L. Shevin	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 21-28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claims 1-28, filed August 12th, 2005 were pending at the time the first Office Action, dated October 16th, 2007 was issued. Claims 21-28 were withdrawn by Applicant's telephone election on 17 September 2007 as non-elected.

For this action, claims 1-28, in Applicant's reply filed February 13th, 2008, are pending. Claims 21-28 remain withdrawn and claims 1-3 and 14 have been amended. No additional claims have been added nor have any claims been cancelled.

Restriction Requirement

2. Applicant has pointed out any specific errors in the Examiner restriction requirement as indicated in the Office Action mailed October 16th, 2007. Therefore, this restriction requirement is made **FINAL**.

Status of Previous Objections

3. The specification was objected to because of a typographical error relating to 'T'. Applicant's amendment to the specification, filed February 13th, 2008 fully corrects this issue, therefore the objection to the specification is withdrawn.

4. Claim 14 was objected to as missing the term "at" before the term "least." Applicant has amended claim 14 to add "at" and thus fully corrects this issue, therefore the objection to claim 14 is withdrawn.

Status of Previous Rejections

5. In the Office Action dated October 16th, 2007, claims 1-8, 10-17, and 19-20 were rejected under 35 U.S.C. 103(a) over Peker (US 5,866,254) in view of Suresh

("Fundamentals of Metal-Matrix Composites"...) and Peker-Johnson (US 5,288,344).

These rejections are maintained. The introductory paragraph has been reproduced below (The text of 35 U.S.C. 103(a) and the Graham factors are in the previous Office Action):

11. Claims 1-8, 10-17, 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Peker et al** (US 5,866,254) in view of **Suresh** (S. Suresh et al. Fundamentals of Metal-Matrix Composites, Chapter 1: Liquid State Processing, Butterworth-Heinemann, Copyright 1993, p. 3-7, 17-18) and **Peker-Johnson** (US 5,288,344 incorporated into 5,866,254 by reference).

One issue worth mentioning before addressing Applicant's claim amendments is that Applicant's reply is mistaken in the rejections applied in the previous Office Action. Applicant states in his reply at p. 9, para 4 that all claims (1-20) were rejected under 103(a) over Peker in view of Suresh and Peker-Johnson. Claims 8 and 9, however, were rejected under 35 U.S.C. 103(a) over Peker in view of Suresh, in further view of Szuecs ("Mechanical properties..."). Claim 18 was rejected under 35 U.S.C. 103(a) over Peker in view of Suresh and Peker-Johnson in further view of Neil (US 4,952,353).

Regarding claim 1, with respect to the additions of "densification" and "...for a specified densification time..." limitations added to the fourth paragraph of claim 1, it would have been obvious to one of ordinary skill in the art, at the time the invention was made, taking the disclosures of Peker, Suresh, and Peker-Johnson as a whole, to modify the process of claim 1 established in the previous Office Action to include densify a densification temperature for a specified densification time. This is because

the process of densifying is carried out at a "densification temperature" in the broadest reasonable sense of the phrase as Peker '254 teaches (Col. 7, lines 29-34) that "the matrix material is heated...and allowed to flow into the mass of reinforcement particles...or *alternatively forced into the mass or reinforcement particles under pressure...*" Suresh then teaches that this process is known as pressure-drive infiltration and works to yield a generally pore-free, and what one of ordinary skill in the art would call a "dense matrix", thus densification (p. 5, col. 2, para 1, lines 10-12). This densification process has benefits including "increased processing speed..." (p. 5, col. 1, para 2, lines 5-9). The teaching about increased processing speed leads one to conclude that the densification is indeed conducted for a specified period of time, thus the operation is not guesswork started and stopped when the operator feels compelled. This process has a definite speed and is thus conducted in a certain amount of time. Furthermore as this pressure-driven infiltration is also mentioned as the most widely investigated for commercial application (p. 5, col. 2, para 1), this similarly leads one to conclude that the process is conducted in a definite period of time as an indefinite period of time would run contrary to the processes used in commercial applications.

With respect to the addition of "for a period of time less than the densification time less than the densification time, wherein said forming temperature is at least 50 °C higher than the densification temperature;", it would have been obvious to one of ordinary skill in the metallurgy arts, at the time the invention was made, taking the disclosures of Peker, Suresh, and Peker-Johnson as a whole, to reheat the solidified composite mixture to a forming temperature for a period of time less than the

densification time and at a temperature at least 50 °C higher than the densification temperature for the following reasons: Peker teaches (col. 5, lines 34-46) that a preferred type of bulk-solidifying amorphous alloy for his composite has a low melting point with a eutectic temperature not more than 50 °C lower than the liquidus temperature. One would be motivated to form the claimed composite at a temperature at least 50 °C higher than the densification (above the melting point as specified earlier in the claim) temperature as one would want to ensure low viscosity by having the alloy at a high temperature to safely ensure that even when not at the preferred eutectic composition the alloy would have sufficient liquid phase to ensure low forces for forming. Peker teaches that the difference between the eutectic temperature and liquidus is not more than 50 °C. Thus one is making a conservative estimate as to the melting temperature so forming can be carried out with relative ease. Peker-Johnson further teaches viscosity as a result effective variable in the deformation (forming) of amorphous alloys (col. 2, lines 41-58). Peker-Johnson teaches that "it is desirable to reduce the viscosity of an amorphous alloy as low as 10^5 poise to make deformation possible at low applied forces." Figure 2 of Peker-Johnson then shows that in the viscosity is minimized above the melting temperature (T_m). Lastly, Peker teaches an example (Example 1, col. 8, lines 1-19), where a TiC-amorphous alloy composite was formed through infiltration (through known fabrication technologies for use in other contexts, col. 7, lines 10 and 11) at about 750 °C. This composite mixture was then reheated to about 900 °C and then subsequently cooled to ambient temperature to form

an amorphous matrix. The 900 C temperature is plainly more than 50 °C higher than the densification (infiltration) temperature of 750 °C

One would be motivated to conduct the reheating step for a period of time less than the densification step as this step coincides with subsequent forming step used to form useful articles and one of ordinary skill, to minimize cost, would want to heat the composite material as fast as possible to minimize energy costs and to enjoy fast overall processing in conjunction with the subsequent forming step whereas the densification step, from Suresh (p. 5, col. 1, sec. 1.1.1.3., para 2), appears designed to be more slow in that pressure must be exerted on molten metal and maintained for a time long enough for solidification to fully run its course.

Regarding claim 2, with respect to the deletion of “and wherein the forming temperature is between the glass transition temperature of the bulk solidifying amorphous alloy and the crystallization temperature of the bulk solidifying amorphous alloy”, this broadens the scope of claim 2 but does in no way affect the status of the rejection previously applied to this claim in view of the rejection of claim 1 stated above.

Regarding claim 3, with respect to the deletion of “wherein the forming temperature is greater than the melting temperature of the bulk solidifying amorphous alloy”, similar to what was done to claim 2, this deletion does not change the rejection applied to claim 3 as the deleted limitation is already reflected in claim 1.

Regarding claim 14, with respect to the addition of the term “at”, the Examiner had interpreted claim 14 as reading “the packing density...is at least 50%..” as stated on p. 4, para 10, of the Office Action dated October 16th, 2007.

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6. In the Office Action dated October 16th, 2007, claims 8 and 9 were rejected under 35 U.S.C. 103(a) over Peker (US 5,866,254) in view of Suresh ("Fundamentals of Metal-Matrix Composites"...), as applied to claims 1-8, 10-17, and 19-20 above, in further view of Szeucs ("Mechanical properties..."). **These rejections are maintained.**

The introductory paragraph has been reproduced below:

13. **Claims 8 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Peker et al (US 5,866,254)** in view of **Suresh (S. Suresh et al. Fundamentals of Metal-Matrix Composites, Chapter 1: Liquid State Processing, Butterworth-Heinemann, Copyright 1993, p. 3-7, 18.)** as applied to claims 1-8, 10-17, 19-20 above, and in further view of **Szeucs (F. Szeucs et al, Mechanical properties of $Zr_{56.2}Ti_{13.8}Nb_{5.0}Cu_{6.9}Ni_{5.5}Be_{12.5}$ ductile phase reinforced bulk metallic glass composite, Acta Mater. 49 (2001) p. 1507-1513.)**

7. In the Office Action dated October 16th, 2007, claims 18 was rejected under 35 U.S.C. 103(a) over Peker (US 5,866,254) in view of Suresh ("Fundamentals of Metal-Matrix Composites"...), and Peker-Johnson (US 5,288,344) as applied to claims 1-8, 10-17, and 19-20 in further view of Neil (US 4,952,353). **This rejection is maintained.**

The introductory paragraph has been reproduced below:

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12. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Peker** et al (US 5,866,254) in view of **Suresh** (S. Suresh et al. Fundamentals of Metal-Matrix Composites, Chapter 1: Liquid State Processing, Butterworth-Heinemann, Copyright 1993, p. 3-7, 17-18) and **Peker-Johnson** (US 5,288,344 incorporated into 5,866,254 by reference) as applied to claims 1-8, 10-17, 19-20 above and in further view of **Neil** (US 4,952,353)

Response to Arguments

8. Applicant's remarks, filed February 13th, 2008, have been fully considered but are not persuasive:

Applicant (p. 11, para 1) argues that neither Peker nor Suresh "ever describe, teach, or even suggest a specific relationship between the times and temperatures used for the densification and reheating steps." Then in the second paragraph on this page Applicant further argues that one of ordinary skill would not have sufficient teaching to modify either of the composite formation methods of Peker or Suresh to control the process times and temperatures. The Examiner refers Applicant to the rejections applied in section 5 (p. 3-6). All these issues raised in Applicant's arguments are fully addressed above. The Examiner submits that further incorporation of the specifics of densification and reheating into the claims would best help to distinguish the instant claims over the prior art of record.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

-- Claims 1-20 are finally rejected

-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588. The examiner can normally be reached on Monday - Thursday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Mark L. Shevin/

Examiner, Art Unit 1793

/Roy King/

Supervisory Patent Examiner, Art Unit 1793

March 14th, 2008

10/521,424